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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SAINT CYR, LEONARD	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/704,509	SUNG ET AL.	
	Examiner	Art Unit	
	Danelle E. Jones	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9-12,18-20 and 28* is/are rejected.

7)☒ Claim(s) *7-8, 13-17, 21-27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1 and 18 have been considered but are moot in view of the new ground(s) of rejection. Converting a formant parameter from narrowband to wideband CELP format is obvious in view of Omari et al.

2. Applicant's arguments filed 10/15/2007 have been fully considered but they are not persuasive. Claims 1-28 preempt a mathematical algorithm and thus nonstatutory. Regarding claim 18, the amendment did not resolve the non-statutory issue. A voice signal is not being transmitted, thus claims 19-28 are nonstatutory.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> **Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.**

Claims 1-28 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims to processes that do nothing more than solve mathematical problems or manipulate abstract ideas or concepts are non-statutory. If the "acts" of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Schrader, 22 F.3d at 294-95,30 USPQZd at 1458-59. Thus, a process consisting solely of mathematical operations without some claimed practical application is drawn to non-statutory subject matter.

In this case, the claims merely recite a step of manipulating coefficients without any practical application being recited (i.e., the results are not tangible because they are not real- world results - the computation remains with the computer). For the claimed process to be statutory it must indicate a practical application where, the claim must either: (A) result in a physical transformation outside the computer for which a practical application is either disclosed in the specification or would have been known to a skilled artisan (pre-computer or post-computer process activity), or (B) be limited to a practical application that produces a useful, concrete, and tangible result.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dejaco US 6,260,009 in view of Omari et al. US 6,711,538.

Regarding **claims 1, 18, and 28** Dejaco discloses a transcoding apparatus between code-excited linear prediction (CELP)-based codecs using bandwidth extension (see col. 6, lines 1-2), the apparatus comprising:

an excitation signal parameter converter which converts excitation signal parameters from an input narrowband bitstream, into excitation signal parameters in an output wideband CELP format (see col. 2, lines 49-53);

and a quantizer which quantizes the wideband CELP format formant parameters converted in the formant parameter converter and the wideband CELP format excitation signal parameter converted in the excitation signal parameter converter, respectively in an output CELP format (see fig. 5, step 506 and col. 6, lines 61-62).

Dejaco does not disclose a formant parameter converter which extracts formant parameters from an input narrowband bitstream, and converts the extracted formant parameters into formant parameters in an output wideband CELP format. However this feature is well known in the art as indicated by Omari et al. US 6,711,538. Omari et al. discloses converting formant parameters from narrowband to wideband CELP format (see col. 2, lines 46-49). Thus it would it would have been obvious to one of ordinary skill in the art to combine the method of converting parameters from narrowband to wideband for the benefit of improving sound quality (see col. 1, lines 17-30).

5. Claims 2-6, 9-12,19-20, and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dejaco US 6,260,009 in view of Omari et al. US 6,711,538, further in view of Omari et al. US 6,539,355.

Regarding **claims 2 and 19,** Dejaco in view of Omari et al. – '538 discloses the apparatus of claim 1, further disclosing wherein the formant parameter converter comprises:

a formant order converter which converts the order of the bandwidth-extended formant parameters, into the order of an output CELP format;

and a formant frame rate converter which adjusts the frame rate of the order-converted formant parameters in order to fit the frame rate of the output CELP format (see col.2, lines 57-60) and provides the frame rate converted formant parameters to the quantizer (see fig. 7, steps 708 and 712 and col. Lines 15-18).

Dejaco in view of Omari et al. –'538 does not disclose a formant bandwidth extender which extracts formant parameters from an input narrow band bitstream, and extends the bandwidth of the extracted narrowband CELP format formant parameters, from a narrowband to a wideband. However this feature is well known in the art as evidenced by Omari et al –'355. Omari et al. '355 discloses a bandwidth extending method an apparatus. It would have been beneficial to use bandwidth to improve sound quality of speech signals (see col.1, lines 20-26). Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use bandwidth extension.

Regarding **claims 3 and 20,** Dejaco in view of Omari et al –'538. discloses the apparatus of claim 1, further disclosing wherein the formant parameter converter comprises:

a 1st formant type converter which extracts formant parameters from an input narrowband bitstream, and converts a type of the extracted formant parameters in the narrowband CELP format into a type suitable for formant bandwidth extension;

a formant bandwidth extender which extends the bandwidth of narrowband parameters whose type is converted in the 1st formant type converter, from a narrowband to a wideband (see Omari et al. col. 4, lines 29-39);

a 2nd formant type converter which converts the type of the bandwidth-extended formant parameters, into a formant type suitable for order conversion (see col. 7, lines 12-14);

a formant order converter which converts the order of the formant parameters whose type is converted in the 2nd formant type converter, into the order of the output CELP format (see col. 7, lines 19-21);

a 3rd formant type converter which converts the type of the order-converted formant parameter, into a formant type appropriate to frame rate conversion (see col. 7, lines 47-50);

a formant frame rate converter which adjusts the frame rate of the formant parameters whose type is converted in the 3rd formant type converter, to fit the frame rate of the output CELP format (see col. 7, lines 58-62);

and a 4th formant type converter which converts the type of the frame rate converted formant parameter, into a formant type for quantization in the output CELP format, and provides the converted formant coefficients to the quantizer (see col. 8, lines 9-15).

Regarding **claim 4,** Dejaco in view of Omari et al-'538 further in view of Omari et al. –'355 discloses the apparatus of claim 3, further disclosing wherein the 1st formant type converter converts a type of the extracted formant parameters in the narrowband CELP format, into a line spectral frequency (LSF) type (see col. 7, lines 53-55, where line spectral frequency is equivalent to line spectral pair).

Regarding **claim 5,** Dejaco in view of Omari et al – '538 further in view of Omari et al. '355. discloses the apparatus of claim 3, further disclosing wherein the 2nd formant type converter converts the type of the formant parameters whose bandwidth is extended to the wideband, into a reflection coefficient type (see col. 7, lines 16-19).

Regarding **claim 6,** Dejaco in view of Omari et al. – '538 further in view of Omari et al. – '355 discloses the apparatus of claim 3, further disclosing wherein the 3rd formant type converter converts the type of the formant parameters whose order is adjusted, into a line spectral pair (LSP) type (see col. 7, lines 53-55).

Regarding **claims 9 and 23,** Dejaco in view of Omari et al. – '538 further in view of Omari et al. – '355 discloses the apparatus of any one of claims 2 and 3, and any one of claims 19 and 20 further disclosing wherein the formant order converter, if an input order is greater than an output order, decimates the input order to fit the output order, and if an input order is less than an output order, interpolates the input order to fit the output order (see col. 7, lines 31-35).

Regarding **claim 10,** Dejaco in view of Omari et al. discloses the apparatus of claim 9 and any one of claims 19 and 20, further disclosing wherein in the decimation of the order conversion, the coefficients greater than the output order are replaced by 0 and in the interpolation of order conversion, the same number of 0's as the lacked order are filled (see col. 7, lines 40-42).

Regarding **claim 11,** Dejaco in view of Omari et al. – '538 further in view of Omari et al. – '355 discloses the apparatus of any one of claims 2 and 3, further disclosing wherein the formant frame rate converter, if an input frame rate is higher than an output frame rate, decimates the coefficients of the input parameter to fit the output frame rate, and if the input frame rate is lower than the output frame rate, interpolates the coefficients of the input parameter to fit the output frame rate (see col. 7, line 63 – col. 8, line 6).

Regarding **claim 12,** Dejaco in view of Omari et al. – '538 further in view of Omari et al. – '355 discloses the apparatus of claim 11 and any one of claims 19 and 20, further disclosing wherein in the decimation of the frame rate conversion, the decimated formant coefficients are obtained by applying appropriate weighting to input formant coefficients of a current frame and those of a previous frame and then adding the weighted coefficients, and in the interpolation of the frame rate conversion, frame rate converted coefficients are obtained by applying appropriate weighting to the input

formant coefficients of a current frame and the input formant coefficients of previous frames and summing the weighted coefficients (see col. 7, line 63 – col. 7, line 6, where the method is simply linear prediction, which is a well-known method discussed in the reference).

Allowable Subject Matter

2. Claims 7-8, 13-17, 21-22, and 25-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

3. The following is a statement of reasons for the indication of allowable subject matter: with respect to the allowable claims, none of the prior art either alone or in combination disclose or teach the claimed combination to warrant a rejections under 35 USC 102 or 103.

Regarding **claims 7-8 and 21-22**; none of the prior art either alone or in combination disclose or teach the claim apparatus specifically including:
a formant coefficient scaling unit which scales the received narrowband formant coefficients to extend the bandwidth in a formant parameter domain, and obtains formant coefficients corresponding to a low band part of an overall wideband formant coefficient. Here, the scaling factor can be determined by a ratio of bandwidth in an input narrowband CELP format and bandwidth in an output wideband CELP format; a narrowband codebook searching unit which by using the received narrowband formant coefficient and referring to a narrowband codebook trained in advance, finds an index of a closest codeword;

a wideband codebook searching unit which by referring to a wideband codebook trained in advance, searches for a wideband codeword corresponding to the index of the narrowband codeword searched by the narrowband codebook searching unit;

a codeword truncation unit which truncates the wideband codeword searched in the wideband codebook searching unit so that only a component corresponding to the high band of the wideband remains;

and a codeword training unit which generates the narrowband codebook and the wideband codebook through training.

Regarding claims 13 –17 and 25-27 none of the prior art either alone or in combination disclose or teach the claim apparatus specifically including:

a perceptual weighted filter (PWF) which is constructed using the formant coefficients obtained through interpolation in the formant coefficient interpolator, and, filters the wideband excitation signal from the excitation signal bandwidth extender; an adaptive codebook searcher which regarding the output signal of the PWF as a target signal, searches an adaptive codebook corresponding to pitch information to fit an output CELP format, calculates the gain of the corresponding codebook, and provides the calculated gain and the searched adaptive codebook index to the quantizer

and a fixed codebook searcher which, using a target signal of a fixed codebook obtained by subtracting the contribution of the adaptive codebook from the output signal of the PWF, searches for a fixed codebook to fit an output CELP format, calculates the gain of the corresponding codebook, and provides the calculated gain and the searched

adaptive codebook index to the quantizer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Danelle E. Jones whose telephone number is 571-270-1241. The examiner can normally be reached on M-F 7:30am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on 571-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DJ
1/19/08

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